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(54) A sound-proofing building element

(57) The element is formed from an apertured or slotted panel (1) having a non-woven fabric (2) applied to the panel (1) in such a manner that the non-woven fabric (2) lies on the panel (1) in a non-detachable manner at all locations and is stretched over the apertures (4) in the panel (1). The non-woven fabric, stretched like a drum skin, produces in the region of the apertures in the panel an increased resistance to flow which defines the desired sound absorbability of the building element. The panel (1) may be of metal, wood, cardboard or plastics and the fabric (2) of paper or fleeces.

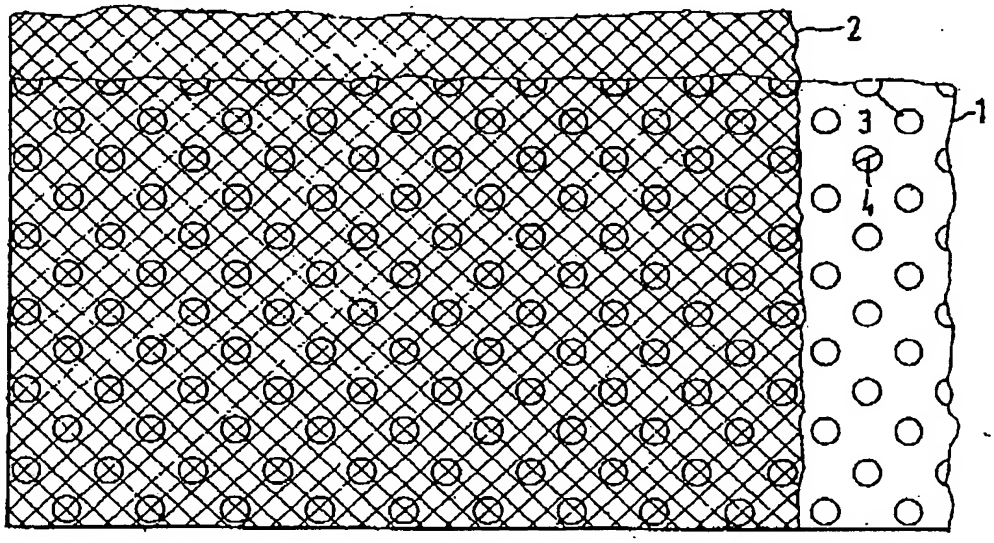

FIG.1

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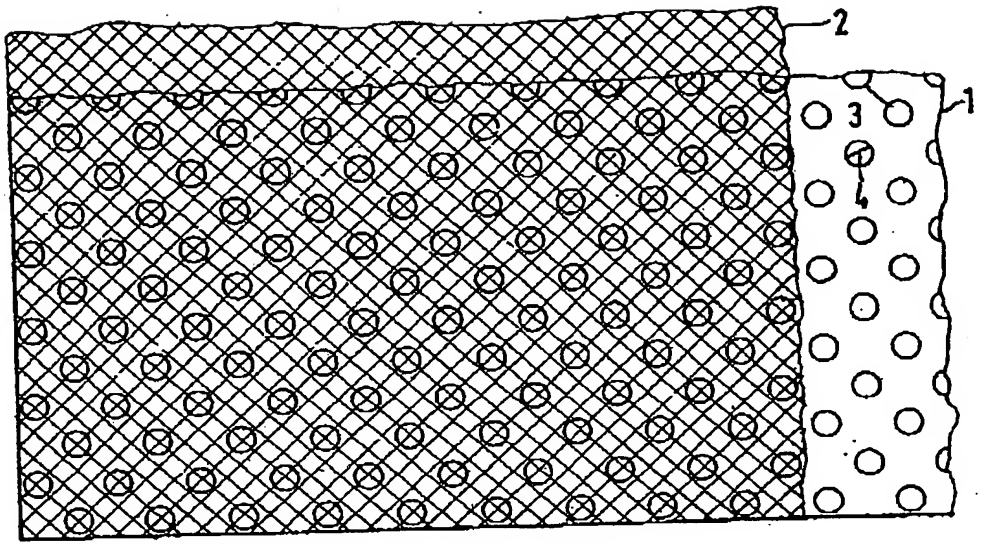

FIG.1

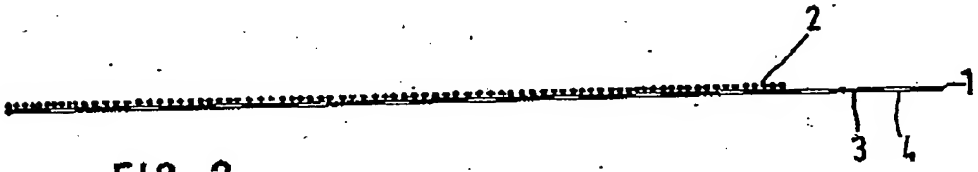

FIG. 2

SPECIFICATION

A sound-proofing building element

The present invention relates to a sound-proofing building element formed from an apertured or slotted panel.

Building elements have been known for a long time which are formed from apertured or slotted panels made of thin-walled sheet metals or similar materials, and they may be used in a sound-absorbing false ceiling by having felt mats made from glass — or rock-wool forming a rear lining for the internal structure.

The sound-absorbing effect of such building elements depends on various criteria and more especially on the so-called free cross-section of the panels, i.e. the ratio between the apertured portions and the entire surface of the panel, the thickness of the inserted sound-absorbing felts, and the space between the sound-absorbing false ceiling and the non-absorbing original ceiling of the building.

The sound-absorbing inserts made from glass or rock-wool are expensive, and the assembly work required at the construction locations to insert the sound-absorbing felts into the ceiling are comparatively high because it is well-known that construction workers are amongst the highest paid workers.

Furthermore, the task of handling the sound-absorbing felts is unpleasant and sometimes even injurious to health since the small glass fibres of the glass- or rock-wool are very brittle and can easily pierce the skin of the hands during the handling process and cause infection. In addition, they also cause irritation to the nose, mouth and throat.

For the manufacture of the various sound-absorbing felts, it is also necessary to fuse the base materials with a high expenditure of energy and to process them by complicated methods to form thin fibres.

The invention seeks to provide a sound-proofing building element formed from an apertured or slotted panel, while also eliminating the above-described disadvantages.

According to the present invention there is provided a sound-proofing building element formed from an apertured or slotted panel, in which a non-woven fabric is applied to the panel in such a manner that the non-woven fabric lies on the panel in a non-detachable manner at all locations and is stretched over the apertures in the panel.

Preferably, the apertured or slotted panel has thin walls and is made of metal, wood, cardboard, plastics material or similar substances, the panel being connected to fine-fibred, porous non-woven fabric which has a selected resistance to flow, to form a non-detachable unit, and in which the fine-pored, fine-fibred non-woven fabric is stretched over the apertures in the panel.

Further preferably, the resistance to flow of the fine-fibred, porous non-woven fabric is manipulated, in the region where it is stretched over the apertures, in that the non-woven fabric is compacted by applying suitable substances thereto.

Also preferably, the resistance to flow of said building element is determined by changing the free cross-section of the apertured or slotted panel or by changing the resistance to flow of the stretched-over non-woven fabric by coating with an adhesive substance which does not completely close the pores in the non-woven fabric.

In a preferred embodiment the non-woven fabric which influences the resistance to flow, is applied to the rear side of the building element, and in which the front side (visible side) of the building element is provided with a conventional surface treatment.

Because of physical laws which have not been fully considered hitherto, the resistance to flow of the sound-absorbing felts used in the past can be achieved with the subject-matter of the invention, and can be set to the degree of effectiveness required for the building, because thin-walled, apertured panels, preferably panels made of sheet metal, are so connected to porous materials, such as, for example, paper, fleeces or non-woven fabrics or textiles, that these materials are stretched or tensioned like a drum skin in the region of the apertures in the panels. The resultant definable resistance to flow can be manipulated in any desirable manner by applying fillers to the non-woven fabric.

The manufacturing costs of the building elements according to the invention are considerably reduced because these building elements are already put, during the course of industrial production, into the sound-proofing state which is necessary for processing at the building site.

The sound-absorbing effect of the building element according to the invention is achieved, in that, in the region of the apertures which have a non-woven fabric or fibre fleece stretched thereover like a drum skin, a definable resistance to flow is produced which eliminates the disturbing sound to a determinable extent in terms of acoustic definability. The apertures in the panel have a nozzle effect which is further intensified by the non-woven fabric placed thereon. The non-woven fabric condenses the aperture in the panel. This nozzle effect is directly related, therefore, to the reduction in the noise level in the room.

By suitable manipulation of the non-woven fabric which is stretched like a drum skin, the resistance to flow can be increased and, as a consequence thereof, the sound-absorbing effect (sound absorption level) can be altered within predetermined frequency ranges.

This manipulation may be achieved, for example, by spraying sealing substances onto the non-woven fabric. These sealing or densifying substances narrow the spaces between the fibres of the non-woven fabric and thereby reduce the flow.

By changing the free cross-section of the apertures in the building element and

appropriately treating the non-woven fabric which is stretched over the apertures, it is easily possible to achieve the sound-absorbing effect of the 30mm-thick acoustic insert used hitherto and made of rock- or glass-wool. The building element according to the invention preferably has a thickness of less than 1 mm, but has the same effect as, or a better effect than, a conventional sound-absorbing panel having a 30mm-thick sound-absorbing matter made of rock- or glass-wool.

The present invention will be further illustrated, by way of example, with reference to the accompanying drawings, in which:

Fig. 1 is a plan view illustrating one portion of a sound-proofing building element according to the invention; and

Fig. 2 is a cross-sectional view through the building element illustrated in Fig. 1.

The building element comprises a base in the form of an apertured, thin-walled panel 1 made of sheet metal and having a fine-mesh non-woven fabric 2 which is stretched over said panel 1 and is fixedly connected to the panel 1. The spacings 3 and the diameters of the apertures 4 are adapted to the resistance to flow which is definable together with the resistance to flow of the non-woven fabric 2 mounted thereon.

CLAIMS

1. A sound-proofing building element formed from an apertured or slotted panel, in which a non-woven fabric is applied to the panel in such a manner that the non-woven fabric lies on the panel in a non-detachable manner at all locations and is stretched over the apertures in the panel.

2. A building element as claimed in claim 1, in which the non-woven fabric, stretched like a drum skin, produces in the region of the apertures in the panel an increased flow resistance which defines the desired sound absorbability of the building element.

3. A building element as claimed in claim 1 or 2, in which the sound-proofing resistance to flow is produced by the free cross-section of the building element, i.e. by the number and diameter of the apertures provided in the panel, and said resistance depends on the density of the non-woven fabric which is applied to the building element and, in the region of the apertures, is stretched over said apertures.

4. A building element as claimed in claim 1, 2 or 3, in which the resistance to flow of said building element is influenced by changing the density of the non-woven fabric.

5. A building element as claimed in claim 4, in which the density of the non-woven fabric is changed by applying appropriate, densifying substances thereto.

6. A building element as claimed in any one of claims 1 to 5, in which the desired sound-absorbing effect of said building element is achieved by changing the entire resistance to flow of the building element.

7. A building element as claimed in any one of claims 1 to 6, in which the apertured or slotted panel has thin walls and is made of metal, wood, cardboard, plastics material or similar substances. The panel being connected to a fine-fibred, porous non-woven fabric which has a selected resistance to flow, to form a non-detachable unit, and in which the fine-pored, fine-fibred non-woven fabric is stretched over the apertures in the panel.

8. A building element as claimed in claim 7, in which the resistance to flow of the fine-fibred, porous non-woven fabric is manipulated, in the region where it is stretched over the apertures in that the non-woven fabric is compacted by applying suitable substances thereto.

9. A building element as claimed in any of claims 1 to 8, in which the resistance to flow of said building element is determined by changing the free cross-section of the apertured or slotted panel or by changing the resistance to flow of the stretched-over non-woven fabric by coating with an adhesive substance which does not completely close the pores in the non-woven fabric.

10. A building element as claimed in any one of claims 1 to 9, in which the non-woven fabric which influences the resistance to flow, is applied to the rear side of the building element, and in which the front side (visible side) of the building element is provided with a conventional surface treatment.

11. A building element as claimed in any one of claims 1 to 10, in which the noise level reduces when there is an increase in the resistance to flow in the region of the apertures in the panel.

12. A sound-proofing building element, substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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